Cross-language phonetic relationships account for most, but not all L2 speech learning problems

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INGE LEHMANNS LEGAT AF 1983

This lecture series

Presents an overview of research on
the characteristics, consequences, and causes
of foreign accented speech in perception and in production,
and the methods used to study them.

Stucture:

1. Social, psychological, and communicative consequences of foreign accentedness
2. Predicting difficulty in L2 speech learning
3. Core aspects of the revised Speech Learning Model (SLM-r)
4. **Do cross-language phonetic relationships provide a full account of L2 speech learning problems?**

L2 speech learning: Do cross-language phonetic relationships provide a full account?

Structure of talk:

- Provide an answer to the question
- Provide examples of the success of models based on cross-language phonetic relationships
- Provide examples of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

L2 speech learning: Do cross-language phonetic relationships provide a full account?

Answer:

No

Not a full account

But cross-language phonetic relationships are quite (not 100%) successful at predicting L2 speech learning

L2 speech learning: Do cross-language phonetic relationships provide a full account?

Structure of talk:

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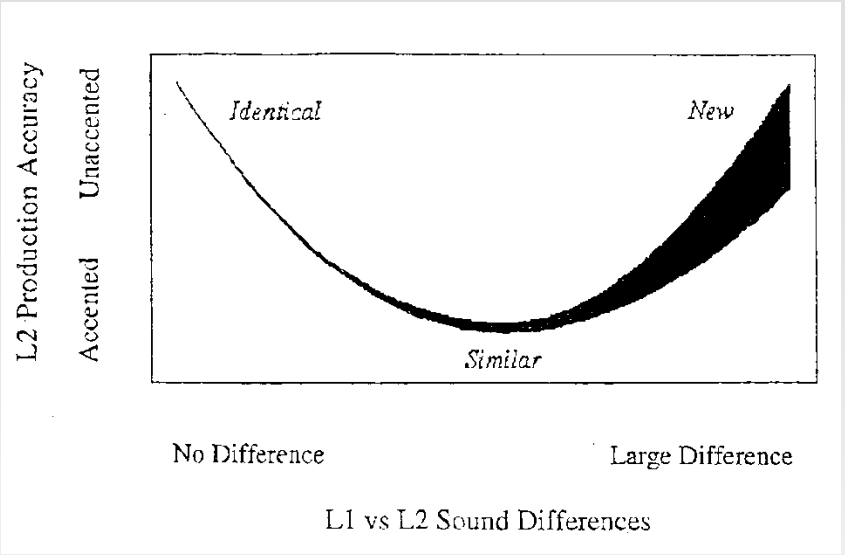
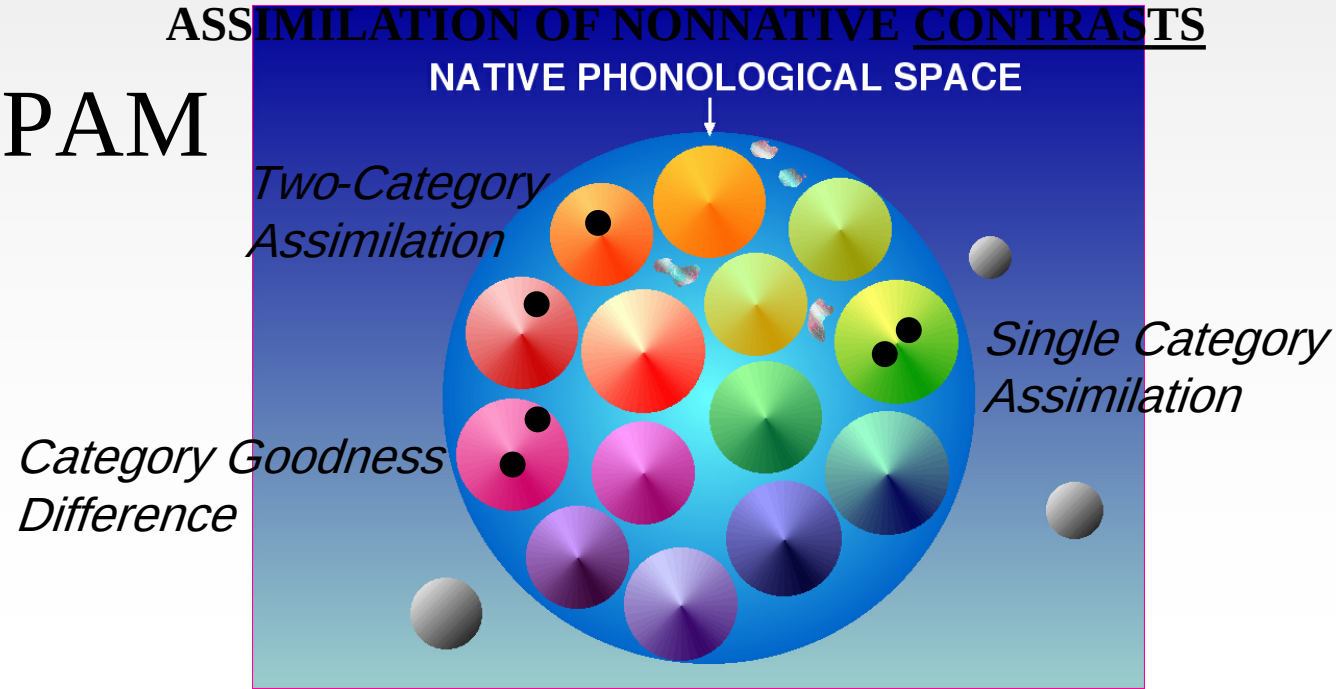
But first: Which models?

Here: Flege's SLM



Best's PAM



Example of successful SLM and PAM prediction of L2 speech learning

The case of L2 Danish /y/ – /u/

[y] – [u]

L1 Spanish /u/

[u]

L1 English /u/

[ʉ]

Example of successful SLM and PAM prediction of L2 speech learning

Garibaldi & Bohn (2017)

Production of Danish /y/, /u/, /i/
by 10 L1 speakers of

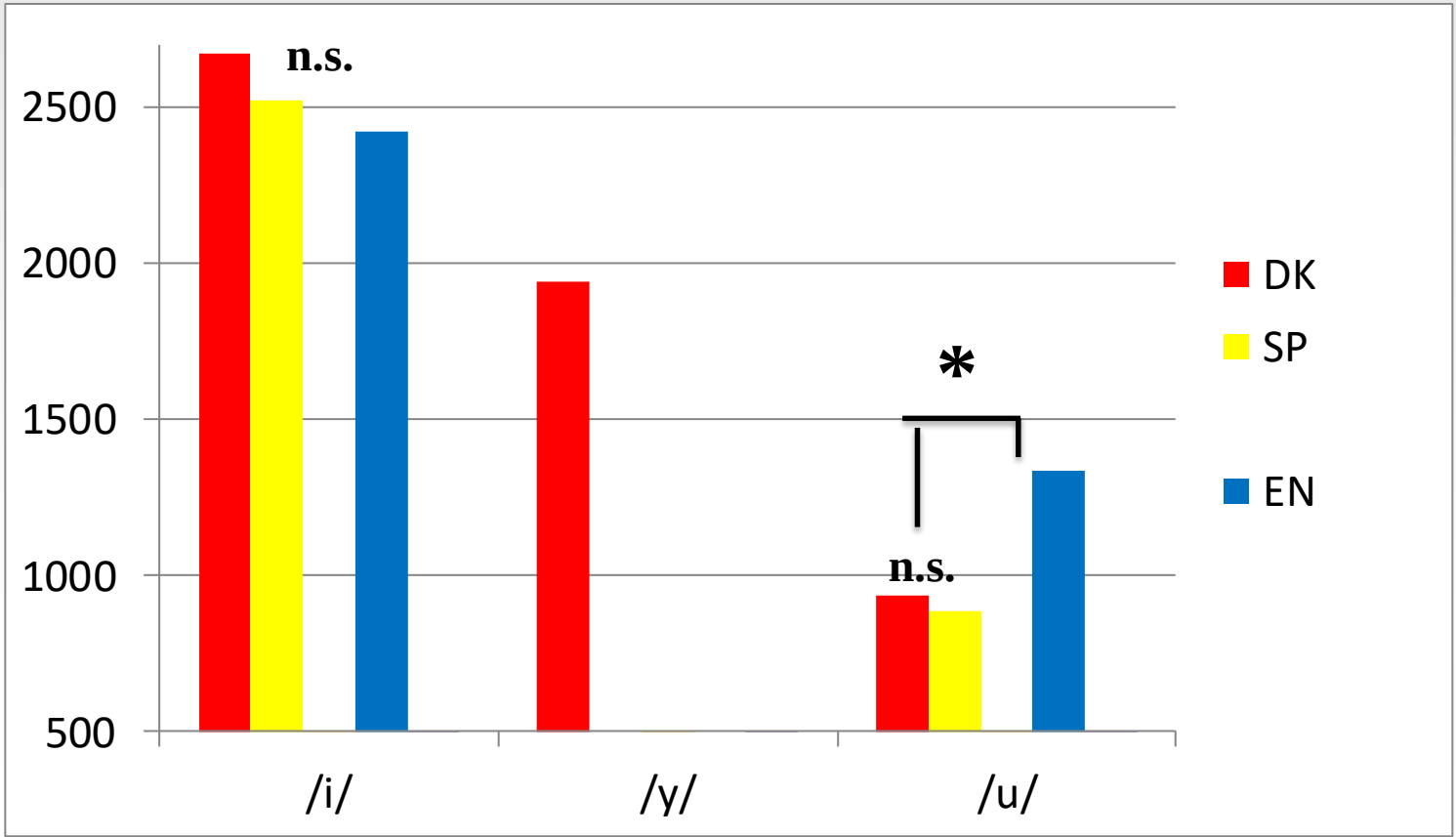
Spanish (LOR in Denmark: m = 10.5 years)

English (LOR in Denmark: m = 12.0 years)

daily use of Danish

Example of successful SLM and PAM prediction of L2 speech learning

F2 for /i, y, u/ in L1 Danish, L1 Spanish, L1 English



Example of successful SLM and PAM prediction of L2 speech learning

Perceptual assimilation / Interlingual identification

Procedure:

Identification of DK [di, dy, du]

as EN <doo> or <dee> (EN listeners),

as SP <tu> or <ti> (SP listeners).

Goodness of fit: 1 (bad) to 5 (perfect)

Example of successful SLM and PAM prediction of L2 speech learning

Perceptual assimilation / Interlingual identification

Danish stimuli	Spanish response		English response	
	/i/	/u/	/i/	/u/
[i]	100 (3.7)		100 (3.3)	
[y]	33.3 (2.1)	66.7 (2.0)		100 (2.4)
[u]		100 (3.6)		100 (3.2)

Mean percent identification of DK [i y, u] as L1 /i/ or /u/ by SP and EN listeners. Goodness ratings (1 = bad, 5 = perfect) in parenthesis

Example of successful SLM and PAM prediction of L2 speech learning

Perceptual assimilation / Interlingual identification

DK [y] → SP /i/, SP /u/ DK [u] → SP /u/

In terms of **PAM**: DK [y]-[i] and [y]-[u]: UC

DK [y] → EN /u/ DK [u] → EN /u/

In terms of **PAM**: DK [y]-[u]: SC or CG

Example of successful SLM and PAM prediction of L2 speech learning

Perceptual assimilation / Interlingual identification

DK [y] → SP /i/, SP /u/ DK [u] → SP /u/

In terms of **SLM**: DK [y] evades equivalence classification

DK [y] → EN /u/ DK [u] → EN /u/

In terms of **SLM**: DK [y] equivalence-classified with EN /u/

Example of successful SLM and PAM prediction of L2 speech learning

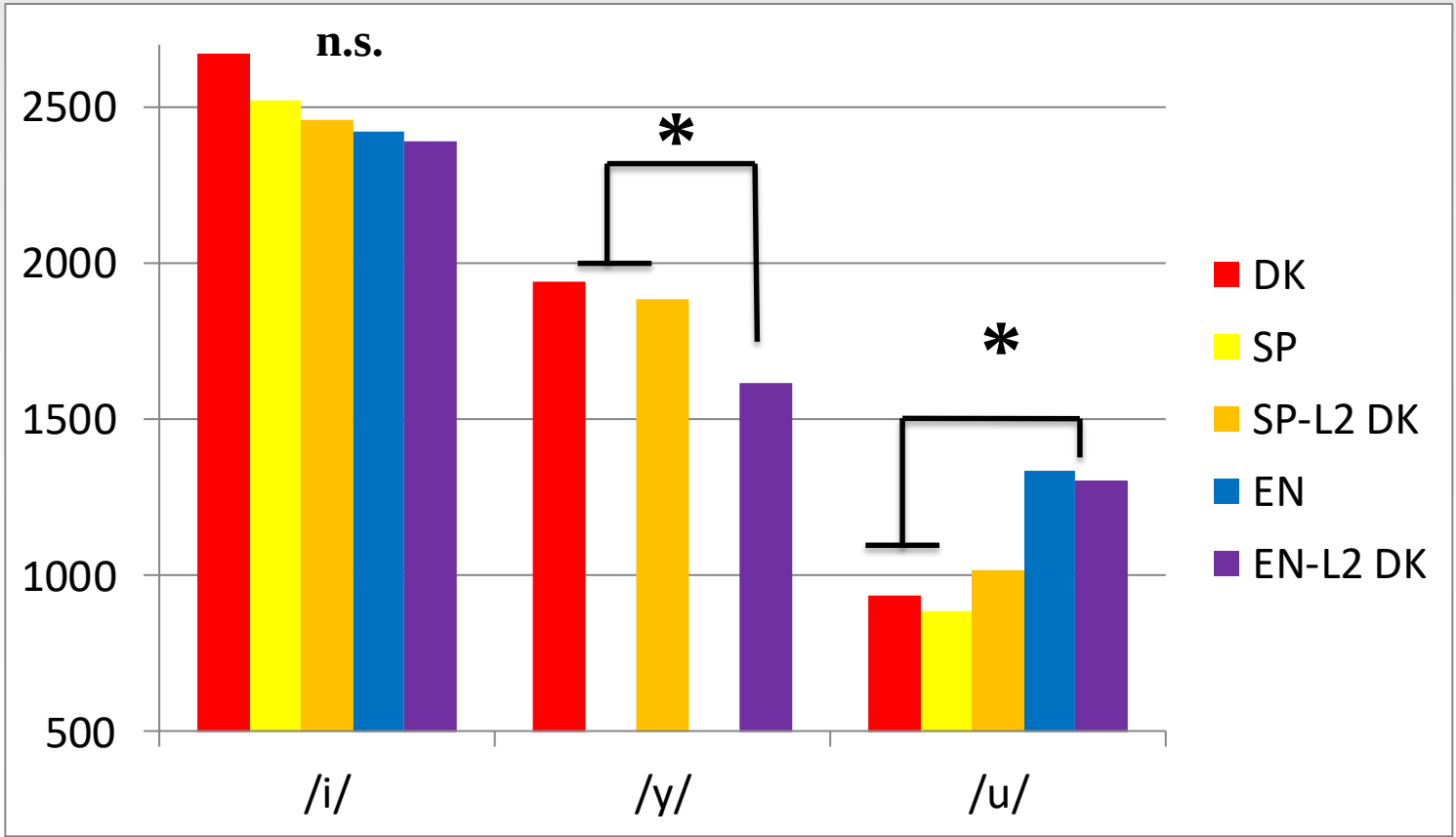
Summary of predictions based on cross-language phonetic similarity:

Experienced L1 SP speakers will produce DK /y/ correctly (no equivalence classification, UC assimilation)

Experienced L1 EN speakers will not produce DK /y/ and /u/ correctly (equivalence classification with EN /u/ ([ʉ]), SC or CG assimilation)

Example of successful SLM and PAM prediction of L2 speech learning

F2 for /i, y, u/ in L1 Danish, L1 Spanish, L1 English and L2 DK



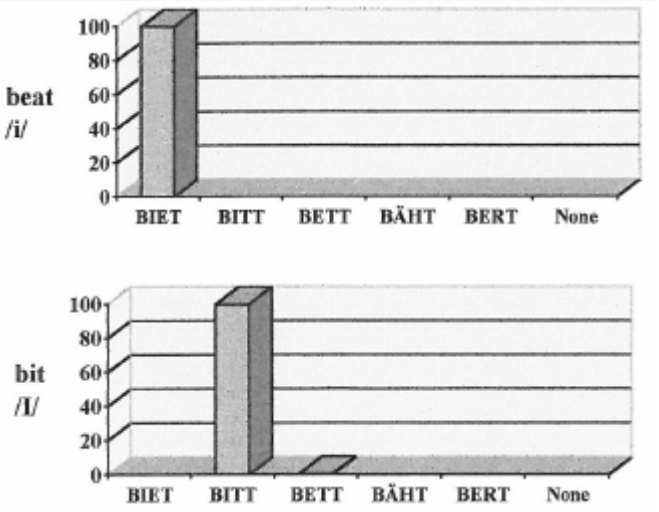
Example of successful SLM and PAM prediction of L2 speech learning

Both SLM and PAM/PAM-L2 by & large successfully predict

- perception difficulty
- learning potential

for L2 sound categories

e.g., Bohn & Flege (1990): TC assimilation of English [i]-[ɪ] to German [i]-[ɪ]: Each English vowel classified as identical to L1 vowel:



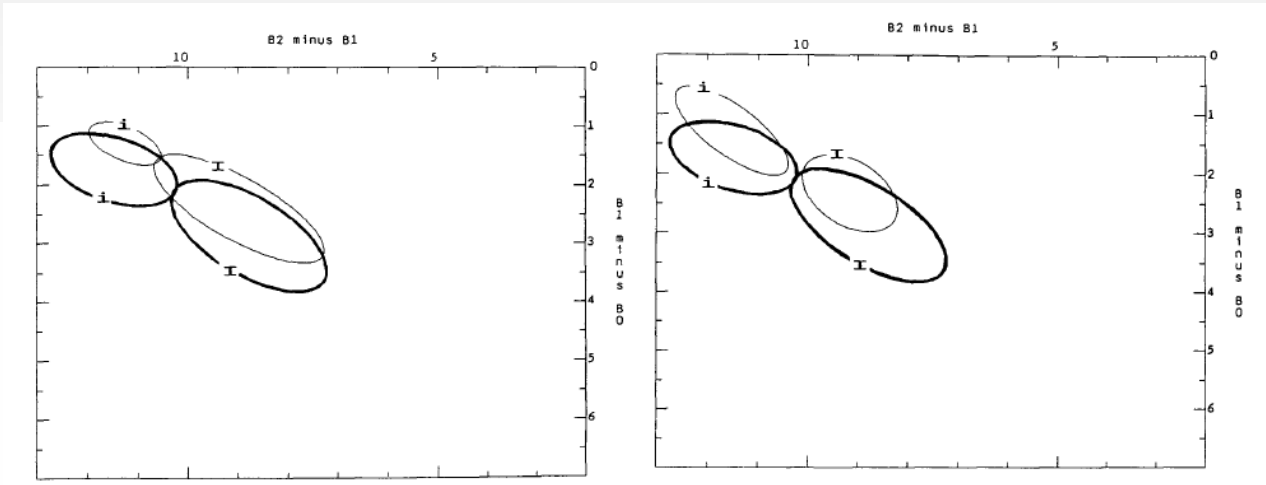


Figure 3. Range of the English vowels /i/ and /I/ as produced by native English speakers and experienced German speakers of English (top panel) and as produced by native English speakers and inexperienced German speakers of English (bottom panel) in the Bark-difference space. (Bold lines: native English speakers; thin lines: native German speakers.)

Example of successful SLM and PAM prediction of L2 speech learning

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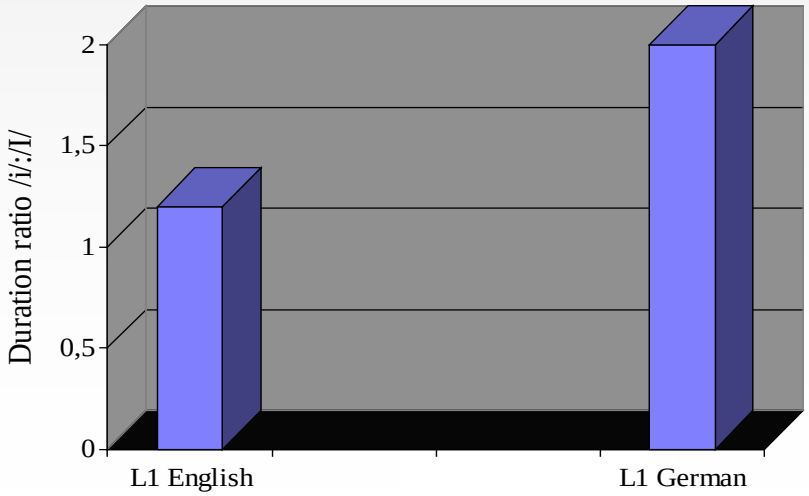
Duration ratio of /i/ and /ɪ/ in English (left) and in German (right)



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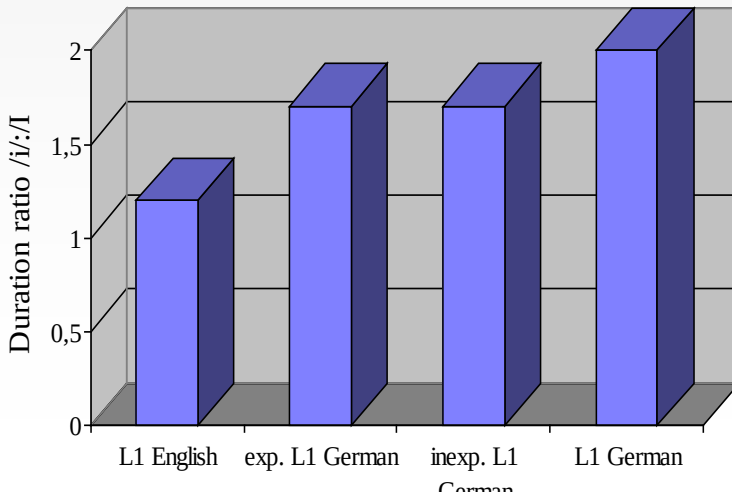
e.g., Bohn & Flege (1990): TC assimilation of English [i]-[ɪ] to German [i]-[ɪ]: Each English vowel classified as identical to L1 vowel:

Duration ratio of /i/ and /ɪ/ in English (left)

and in German (right), and in German accented English (center)



Example of successful SLM and PAM prediction of L2 speech learning

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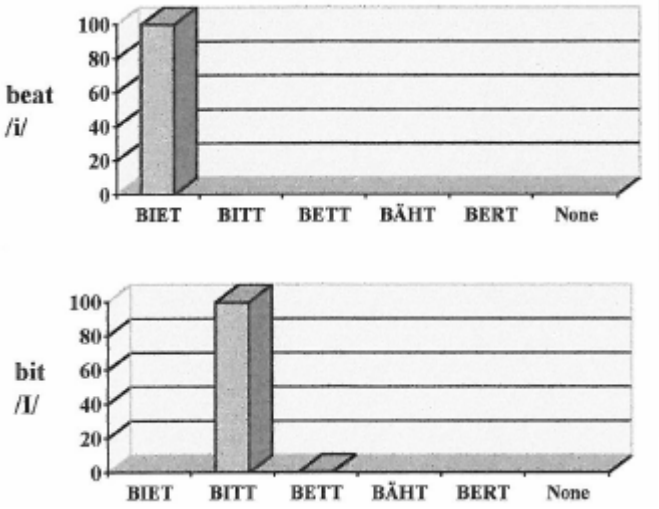


TABLE IV. The mean temporal and spectral effect scores obtained for the nine groups of subjects. Means to the left of the slashes, which were used in the analyses reported in the text, were calculated after removing the signs of the difference scores. Means to the right of the slashes are based on the signed values, and thus show the effect of "reversals" (see text). Underlined means differed significantly from the NE subjects' mean values (boldfaced) according to a Tukey's post-hoc test ($p < 0.01$)

		beat vs. bit		*bet vs. bat*	
Native language	L2 experience	Temporal effect	Spectral effect	Temporal effect	Spectral effect
English	—	**11/9**	**88/88**	**15/15**	**98/98**
German	Experienced	30/32	64/64	45/45	70/70
	Inexperienced	36/35	63/63	59/59	43/38

L1 perceptual biases

Awarenes of these biases: at least 135 years ago:

Hale (1885) on [ʔ] in Hawai'ian: "The first misisonaries to these islands were intelligent and well-educated men; but, accustomed only to the English pronunciation, they failed to notice this delicate trace of utterance"

Boas (1889): " … well-trained observers … each apperceives the unknown sounds by means of the sounds of his own language." " … this unvoluntary assimilation"

Polivanov (1931): "The perception of sounds has a subjective nature and is different for speakers of different language … depending on the … language habits attained by every individual in the process of mastering his native tongue"

Successful SLM and PAM predictions of L2 speech learning

…. could lead one to believe that

L2 speech learning = f (cross-language phonetic relationships)

L2 speech learning: Do cross-language phonetic relationships provide a full account?

Structure of talk:

- Provide an answer to the question
- Provide examples of the success of models based on cross-language phonetic relationships
- Provide examples of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Examples of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

e.g., universal preference for vowels that are peripheral in the articulatory/acoustic vowel space

Revealed by perceptual asymmetries in nonnative vowel perception as described and interpreted by the NRV framework (Polka & Bohn 2003, 2011)

Background →

The NRV framework

Background: Many infant speech perception studies:

change/no change discrimination (e.g., HT procedure)

Infant is presented with tokens from background category; presentation might change to tokens from foreground category

dut…. dut …. dut …. dyt …. dyt …. dyt…

The NRV framework

Important: Counterbalancing of foreground and background categories.

Counterbalancing in, e.g., discrimination of /u/-/y/:

50% of participants hear /u/ -> /y/

….dut…. dut …. dut …. dyt …. dyt …. dyt…

50% of participants hear /y/ -> /u/

….dyt …. dyt …. dyt …. dut …. dut …. dut…

BECAUSE:

Discriminability can depend on the direction of presentation, e.g., /y/ -> /u/ easier to discriminate than /u/ -> /y/:

Perceptual Asymmetry

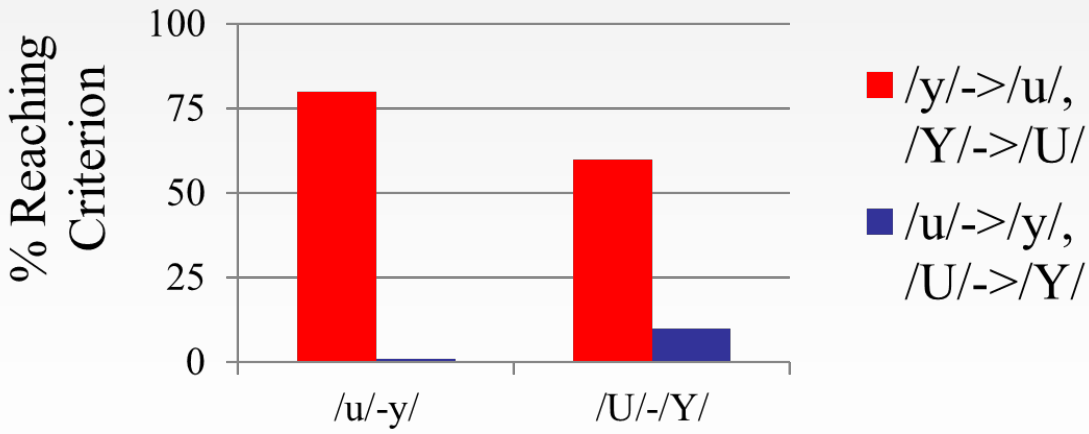
The NRV framework

Universal preference 2: Natural Reference Vowels

Perceptual asymmetries in (infant) speech perception:

First observed: Swoboda et al. 1976, 1978: /i/ → /ɪ/ hard, /ɪ/ → /i/ easy

First systematically observed & interpreted:
Polka & Werker (1994)
Polka & Bohn (1996):
/u/→/y/ hard, /y/→/u/ easy
/ʊ/→/ʏ/ hard, /ʏ/→/ʊ/ easy
/æ/ →/ɛ/ hard, /ɛ/→ /æ/ easy



The NRV framework

Perceptual asymmetries reviewed, tested, reported, discussed in Polka & Bohn 2003, 2011, Bohn & Polka 2014

[ɪ] → [i] Swoboda et al. 1976, 1978, Bohn & Polka 2001, Barrios et al. 2016, …

[ʏ] → [ʊ] Polka & Werker 1994

[y] → [u] Polka & Werker 1994, Polka & Bohn 1996

[ɛ] → [æ] Polka & Bohn 1996, Simon et al. 2013, Scharinger et al. 2012

[ʉ] → [y] Best et al. 1997; [ʉ] → [u] Masapollo et al. 2017

[ɪ] → [e] Bohn & Polka 2001

[e] → [i] Bohn & Polka 2001, Vera-Costan & Sebastian-Galles 2008, Berti & Roque 2013, Pons et al. 2012, Karypidis et al. 2008, …

[ʊ] → [o] Bohn & Polka 2001

[ɛ] → [e] Sebastian-Galles et al. 2005, Larsson et al. 2008,

[ʌ] → [ɒ] Bohn 2007, Polka & Bohn 2011

[o] → [u] Dufour et al. 2013

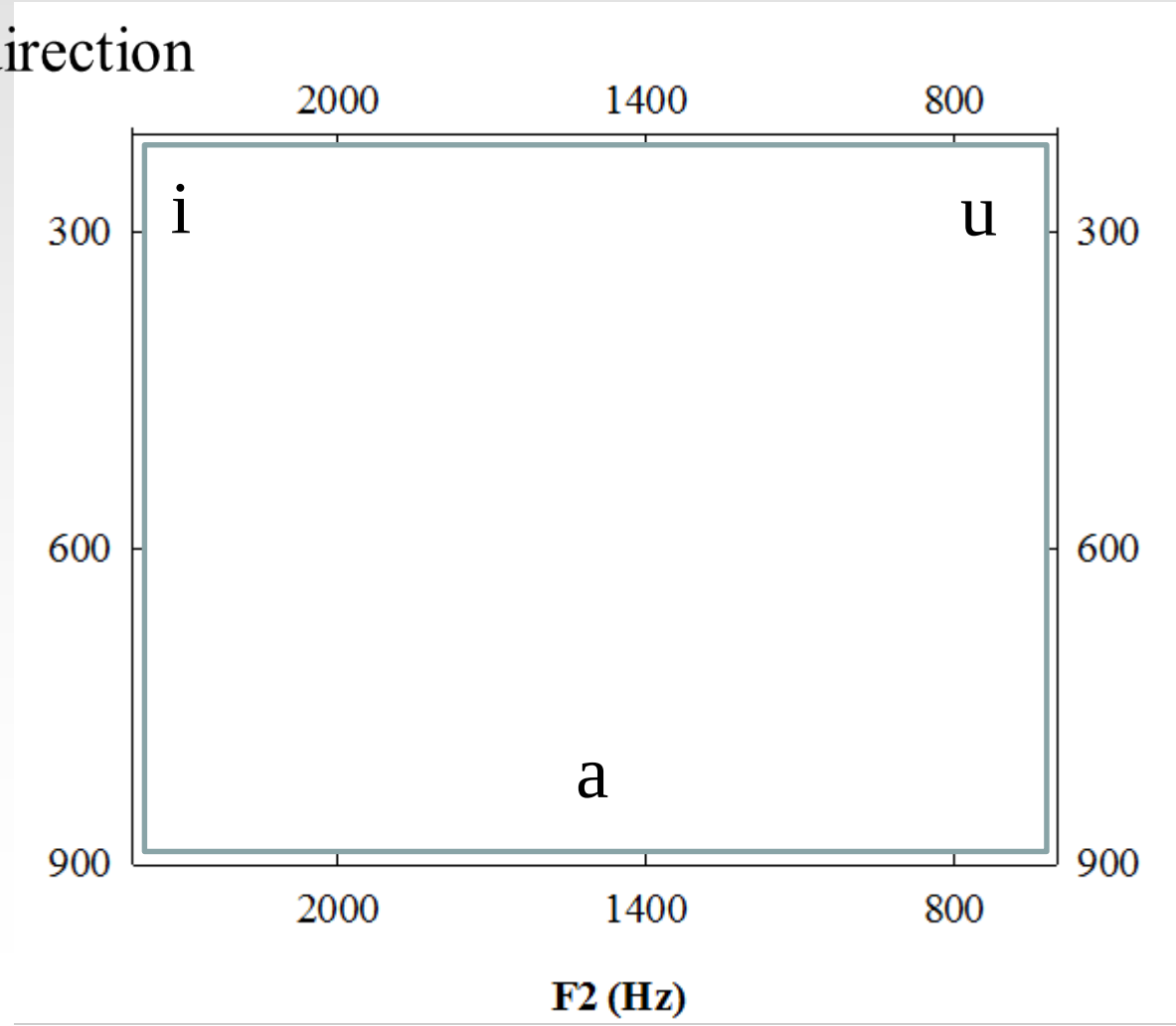
[ʌ] → [ɑ] Garcia & Froud 2018

[æ] → [ɑ] Barrios et al. 2016

The NRV framework

Perceptual asymmetries reviewed, tested, reported, discussed in Polka & Bohn (2003, 2011); Bohn & Polka (2014)

→ easier direction

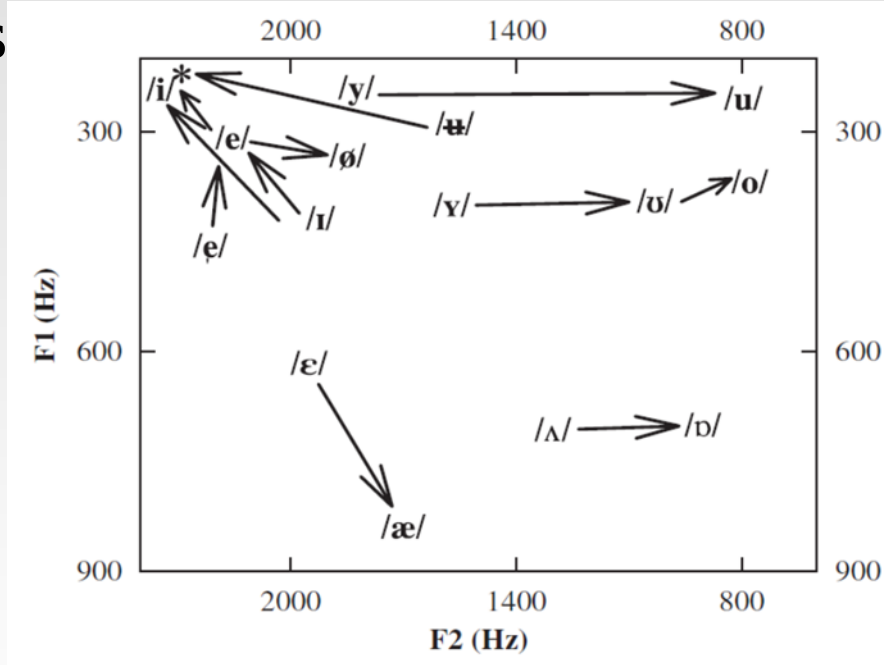


The NRV framework

Perceptual asymmetries reviewed, tested, reported, discussed in Polka & Bohn (2003, 2011); Bohn & Polka (2014)

Infants respond differently to vowels that occupy different positions in the articulatory/acoustic vowel space.

→ easier direction



These robust and L1-independent asymmetries point to a universal perceptual bias that infants bring to the task of vowel discrimination

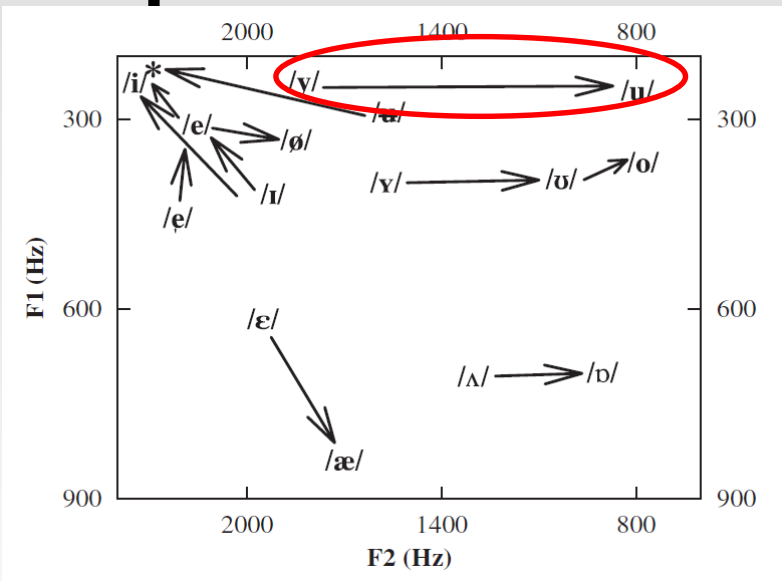
This bias favors relatively peripheral vowels:

Natural Referent Vowels

The NRV framework

Asymmetries in infant vowel perception studies:

- Independent of
  - L1
  - Stimulus properties:
    - nat vs. synth
    - duration
  - F1 or F2 increase/decrease



- Relative: /e/ is both attractor & attracted
- Replicated: /y/→/u/, /ʏ/ → /ʊ/

Additionally: Infants show attentional preference (in Headturn Preference Procedure) for vowels that are attractors (in HT discrimination), e.g., /i/ (vs. /ɪ/) and /u/ (vs. /y/)

The NRV framework

How is this bias affected by language experience?

Hypothesis:

Language experience modifies the initial bias to optimize processing of vowel categories in ambient language: Asymmetries will be maintained or reduced in accordance with native language vowel categories.

Specific predictions:

If only one vowel within a pair is functional in the native language, the bias will remain.

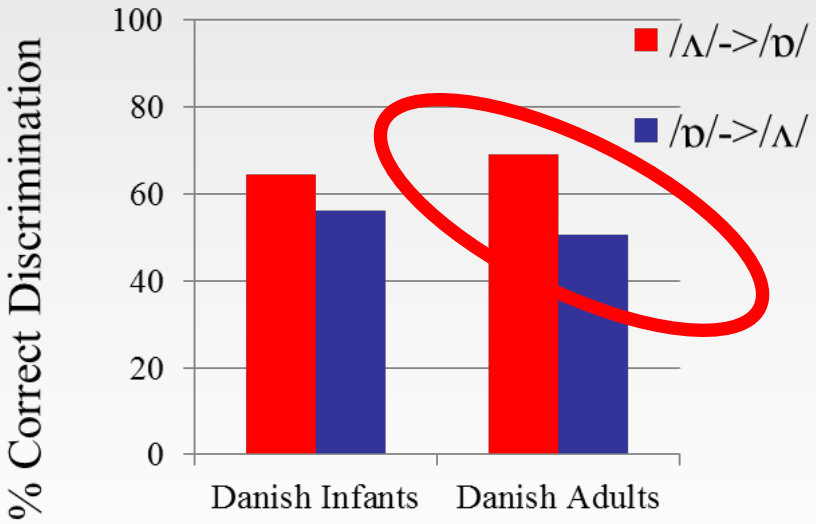
Discrimination asymmetry same as infants

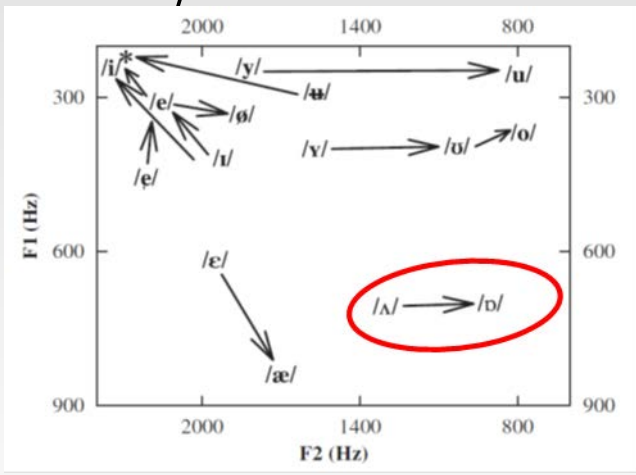
If both vowels within a pair are functional in the native language, the initial bias will fade.

No asymmetry in discrimination

What happens with development? / How does language experience affect bias for NRVs?

Danish-learning infants and Danish adults:
Discrimination accuracy for SBE /ɒ/-/ʌ/

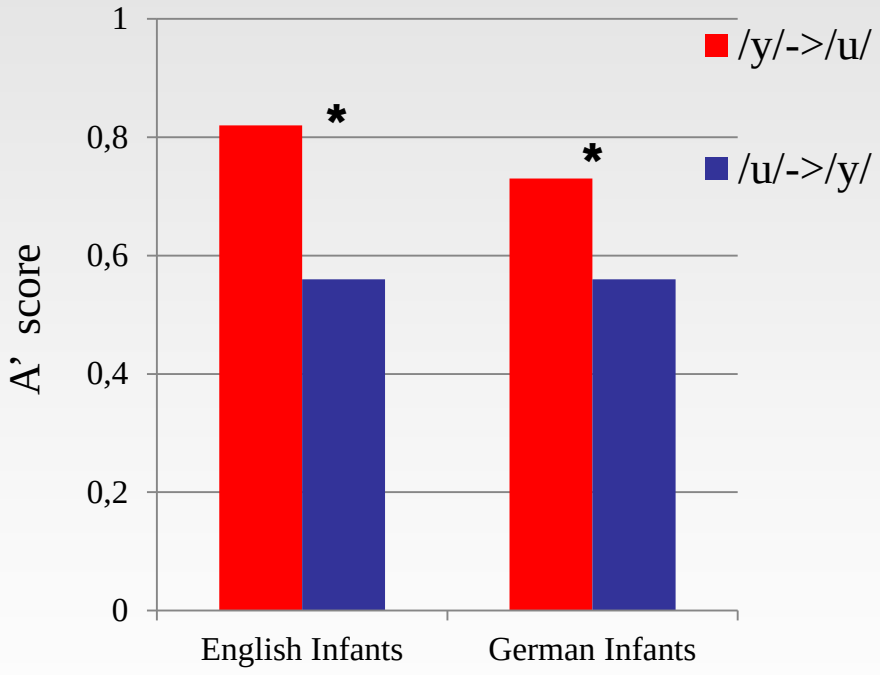


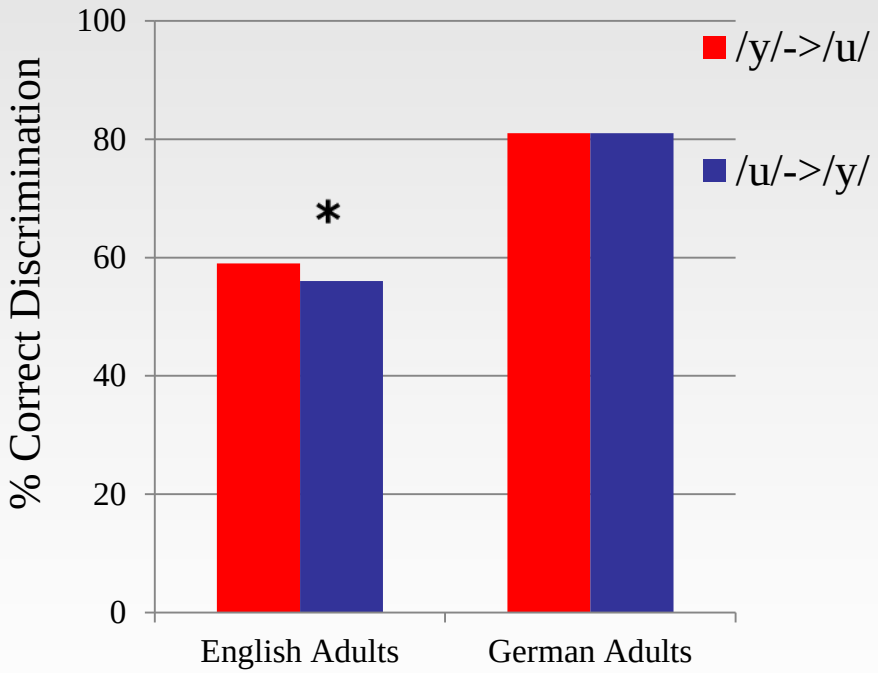


Consistent with NRV claim that perceptual bias favoring relatively peripheral vowels is maintained if listener lacks experience

What happens with development? / How does language experience affect bias for NRVs?

The case of /u/-/y/





Consistent with NRV claim that perceptual bias favoring relatively peripheral vowels is maintained if listener lacks experience

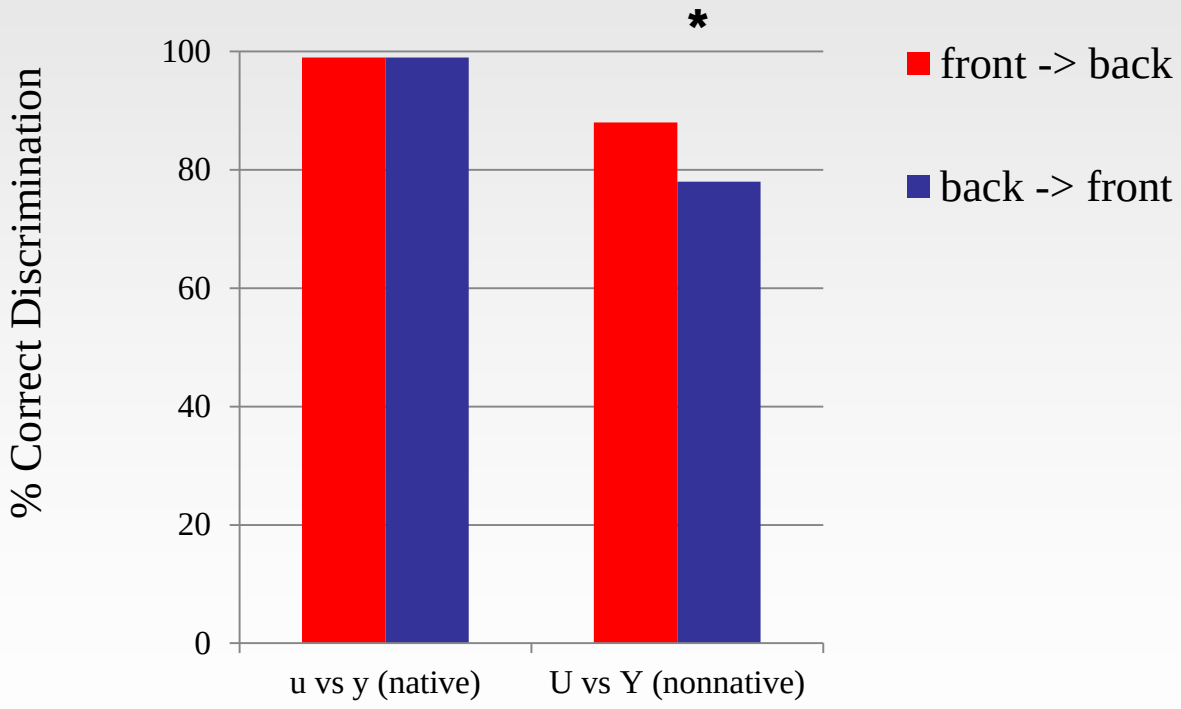
How does language experience affect bias for NRVs?

Polka, Sundara, Zhao, Pang, & Ciocca (in prep.)

- **Stimuli: German /u/-/y/ and /ʊ/-/ʏ/**
  Same as Exp 1
- **Subjects: Cantonese-speaking adults**
  1. With no phonetics training
  2. With phonetics training
- **Predictions:**
  /u/-/y/ is phonemic in Cantonese: No asymmetry
  /ʊ/-/ʏ/ NOT phonemic in Cantonese: Asymmetry
- **Task: AX task**

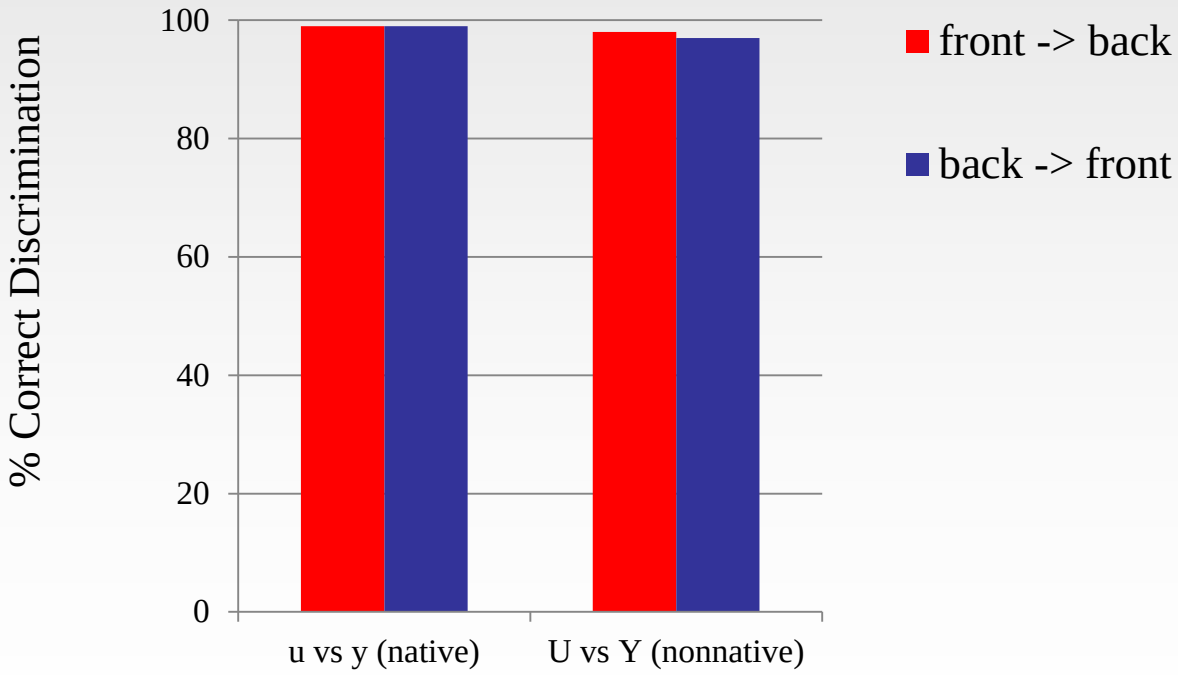
The NRV framework

Cantonese Adults
Discrimination Accuracy



The NRV framework

Cantonese Adults
(phonetically trained)
Discrimination Accuracy



The NRV framework

Conclusion:

Behavioral and neurological evidence:

(Early) native and nonnative vowel perception is universally biased in favor of

Natural Referent Vowels

For human language learners,

“the phonetic … landscape is an uneven terrain”

(Nam & Polka 2016)

What about consonants and tones?

Evidence for Natural Referent **Consonants**

Nam & Polka (2016): ”The phonetic landscape in infant consonant perception is an uneven terrain”

Infants (5-6 months old):
Perceptual asymmetry in ”look-to-listen” discrimination of
/b-v/: /b/<-/v/

Altvater-Mackensen, van der feest & Fikkert (2013):

Perceptual asymmetry in ”look-to-listen” discrimination of
/b-v/: /b/<-/v/ (18 months old), NO asymmetry at 25 months

Tsushima et al. 2003:

Adults (L1 Japanese, L2 English):
Perceptual asymmetry in AX discrimination of
/b-v/: /b/<-/v/

What about consonants?

Evidence for Natural Referent **Consonants**

Tsuji et al. (2015):

Infants (4-6 months old):
Perceptual asymmetry in visual preference procedure discrimination of /m-n/: coronal <- labial

Walter & Hacquard (2004):

Adults (various L1s):
Mismatch negativity /b-d/ and /m-n/: coronal <- labial

Schluter, Politzer-Ahles & Almeida (2016):

Adults (various L1s):
Mismatch negativity /s-f/: coronal <- labiodental

Scharinger et al. (2012):

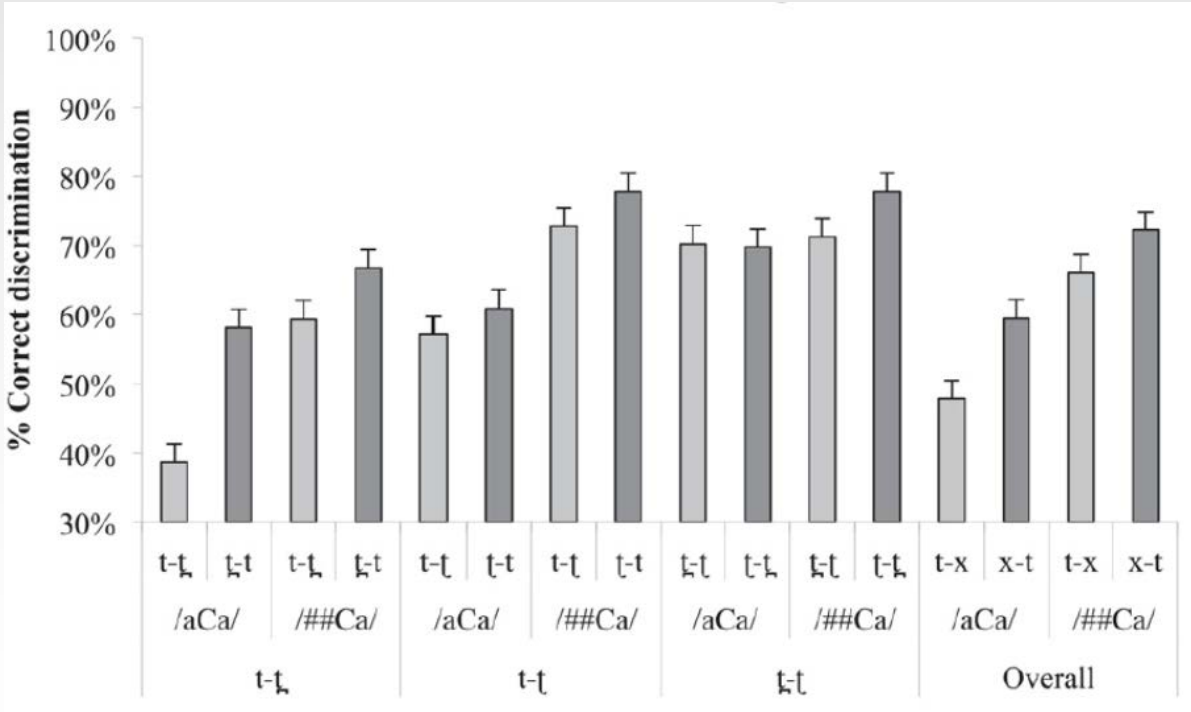
Adults (L1 German):
Mismatch negativity /t-k/: coronal <- velar

What about consonants?

Evidence for Natural Referent **Consonants**

Bundgaard-Nielsen et al. (2015):

Discrimination of Wubuy /t, ʈ, ʈ̪/ by L1 English listeners



XAB discrimination:
alveolar <- dental
alveolar <- retroflex

What about consonants?

Evidence for Natural Referent **Consonants**

Lai (2009): AX discrimination of Mandarin Chinese affricates [tʂ], [tʂʰ], [ts], [tsʰ], [tɕ], [tɕʰ] by L1 Taiwanese, L1 Malay, L1 Burmese listeners

9 contrasts

TABLE 7
Kinds of errors for Mandarin affricate pairs

Pair	*Group*	*TW*	*MA*	*BU*
1. [tʂ]-[ts]	[tʂ] heard as [ts]	**22(69%)**	**28(70%)**	**30(75%)**
	[ts] heard as [tʂ]	**10(31%)**	**12(30%)**	**13(25%)**
	Subtotal	32	40	43
2. [tʂ]-[tɕ]	[tʂ] heard as [tɕ]	0(0%)	2(40%)	6(50%)
	[tɕ] heard as [tʂ]	0(0%)	3(60%)	6(50%)
	Subtotal	0	5	12
3. [ts]-[tɕ]	[ts] heard as [tɕ]	0(0%)	5(50%)	6(46%)
	[tɕ] heard as [ts]	0(0%)	5(50%)	7(54%)
	Subtotal	0	10	13
4. [tʂʰ]-[tsʰ]	[tʂʰ] heard as [tsʰ]	**27(71%)**	**32(73%)**	**35(74%)**
	[tsʰ] heard as [tʂʰ]	**11(29%)**	**12(27%)**	**12(26%)**
	Subtotal	38	44	47
5. [tʂʰ]-[tɕʰ]	[tʂʰ] heard as [tɕʰ]	0(0%)	4(50%)	6(43%)
	[tɕʰ] heard as [tʂʰ]	0(0%)	4(50%)	8(57%)
	Subtotal	0	8	14
6. [tsʰ]-[tɕʰ]	[tsʰ] heard as [tɕʰ]	1(33%)	5(50%)	8(47%)
	[tɕʰ] heard as [tsʰ]	2(67%)	5(50%)	9(53%)
	Subtotal	3	10	17
7. [tʂ]-[tʂʰ]	[tʂ] heard as [tʂʰ]	3(60%)	5(56%)	8(50%)
	[tʂʰ] heard as [tʂ]	2(40%)	4(44%)	8(50%)
	Subtotal	5	9	16
8. [ts]-[tsʰ]	[ts] heard as [tsʰ]	1(33%)	4(44%)	14(48%)
	[tsʰ] heard as [ts]	2(67%)	5(56%)	15(52%)
	Subtotal	3	9	29
9. [tɕ]-[tɕʰ]	[tɕ] heard as [tɕʰ]	0(0%)	1(50%)	6(46%)
	[tɕʰ] heard as [tɕ]	1(100%)	1(50%)	7(54%)
	Subtotal	1	2	13

Asymmetries involve alveolar/dental <- retroflex

What about consonants?

Different methods, different participants:

Fairly clear evidence for Natural Referent **Consonants**

Manner of articulation: stop <- fricative

Place of articulation: coronal <- labial
coronal <- labiodental
coronal <- velar
alveolar <- dental
alveolar <- retroflex

What's attractive about coronals/alveolars and/or stops?

What about consonants?

Why are alveolars/coronals and/or stops

Natural Referent **Consonants**?

Lai (2009) suggests that the consonant perception asymmetries ”followed markedness statements”

Scheringer et al. (2012) mention “underspecification”

Vowel perception asymmetries are unrelated to “markedness” or “underspecification”

Can descriptive notions such as “markedness” and “underspecification” help to understand perceptual asymmetries for consonants?

What about tones?

Studies on the perception of Mandarin tone

Politzer-Ahles et al. (2016):

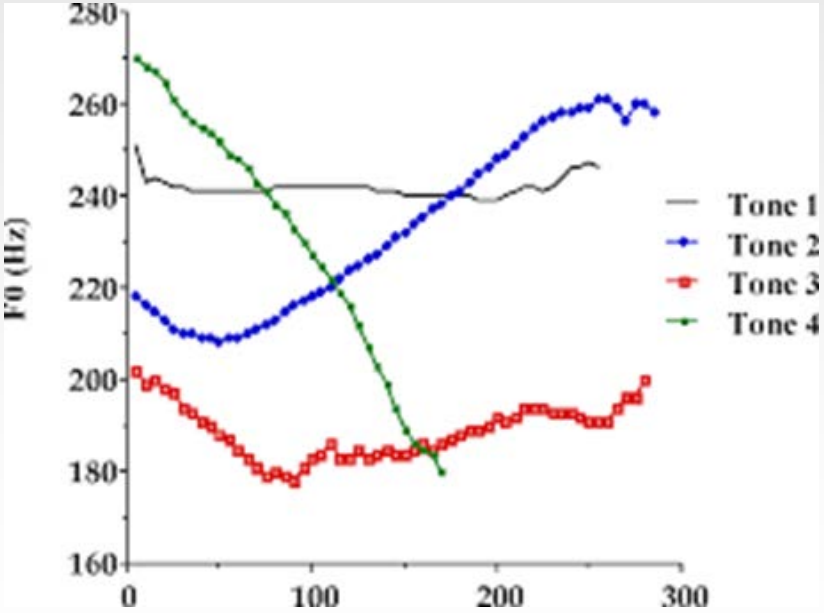
Adults (various L1s, including Mandarin)

Mismatch negativity: T3 <-T1, T3 <-T2, T3<-T4

Li & Chen (2015):

Adults (L1 Mandarin)

Mismatch negativity: T3<-T2



What about tones?

Studies on the perception of Mandarin tone

Wayland et al. (2020):

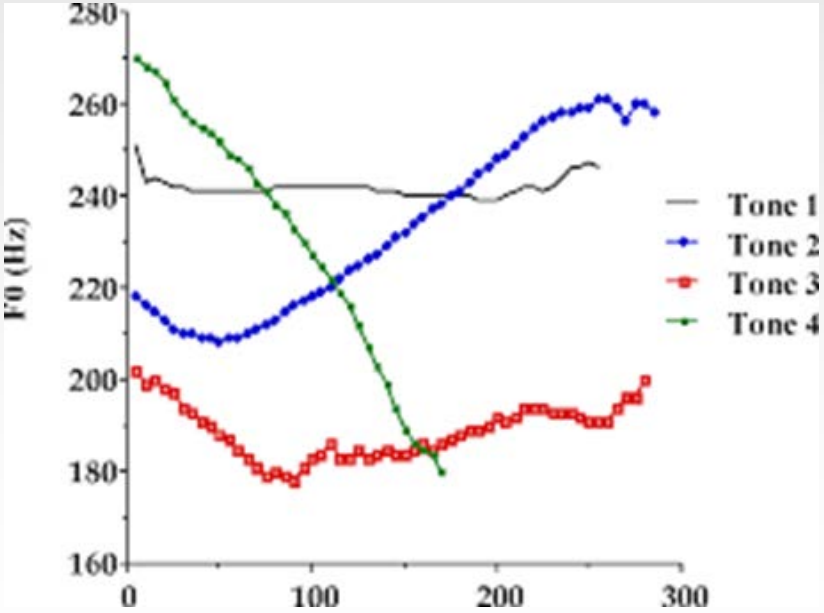
Adults (L1 Cantonese, L1 Mandarin)

AX discrimination

tone 1 -> all other tones: easy;

tone 3 -> all other tones: difficult

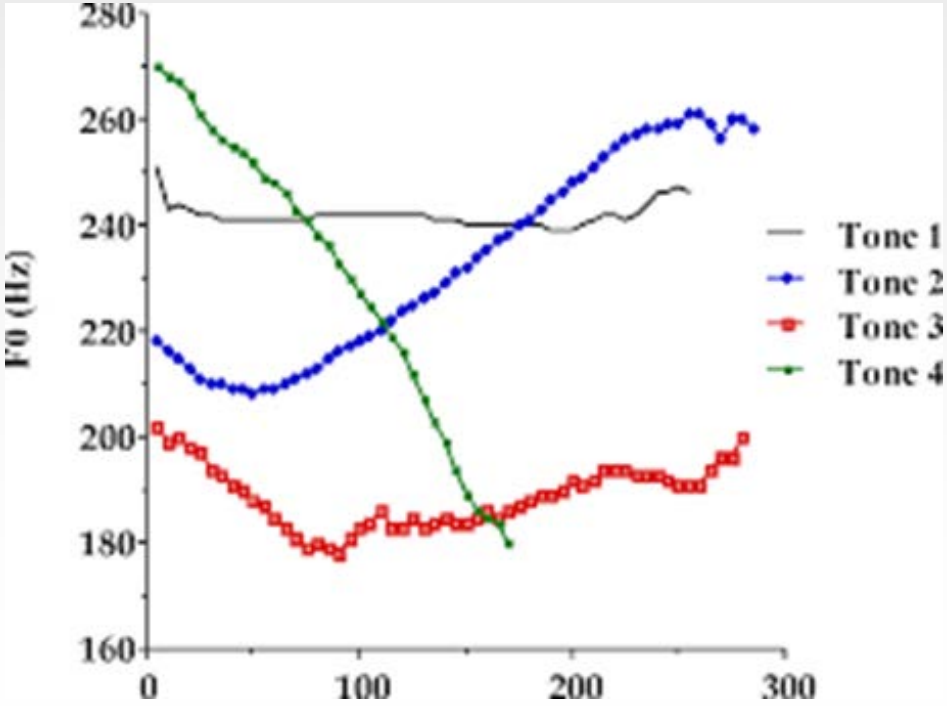
(independent of L1)



Conclusion for tones

In the (few) studies on perceptual asymetries in (Mandarin) tone perception:

Tone 3 seems to be Natural Referent Tone



Summary of examples 1 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

"The phonetic … landscape is an uneven terrain"

Universal, L1-independent biases for

- Vowels that peripheral in the vowel space: NRVs
- Consonants that are coronal/alveolars and/or stops: NRCs
- Tones: (So far only one tone, T3 in Madarin)

Example 2 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Reliance on acoustic properties which are nonfunctional in the L1 and dysfunctional for the perception of nonnative vowels and consonants

as captured by **Desensitization Hypothesis**:

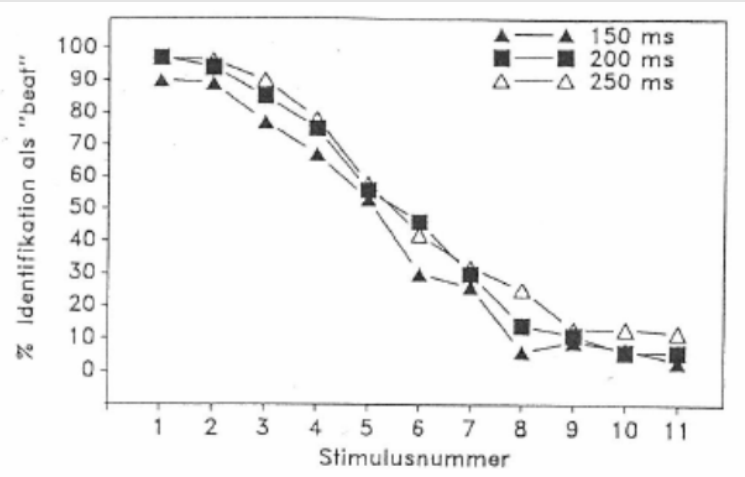
Background →

Background: The Desensitization Hypothesis

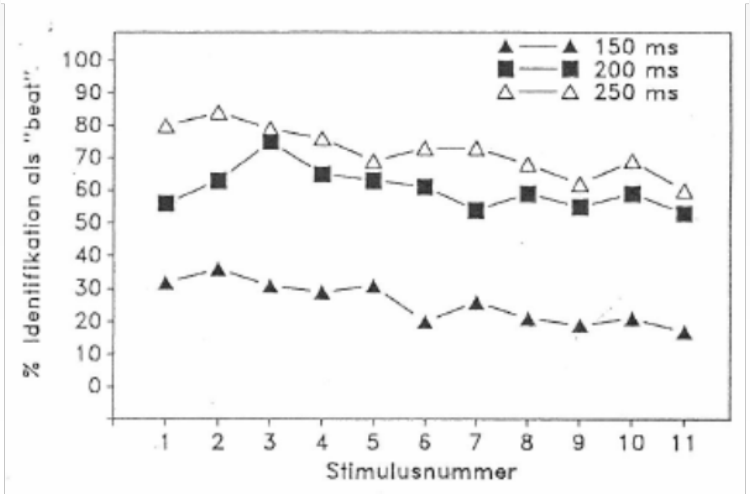
Use of duration cue by L1 Spanish listeners
→ Desensitization Hypothesis

Identification of a *beat-bit* continuum
(11 spectral steps between *beat* and *bit*,
3 duration steps – long, medium, short)

Native English listeners



Native Spanish listeners

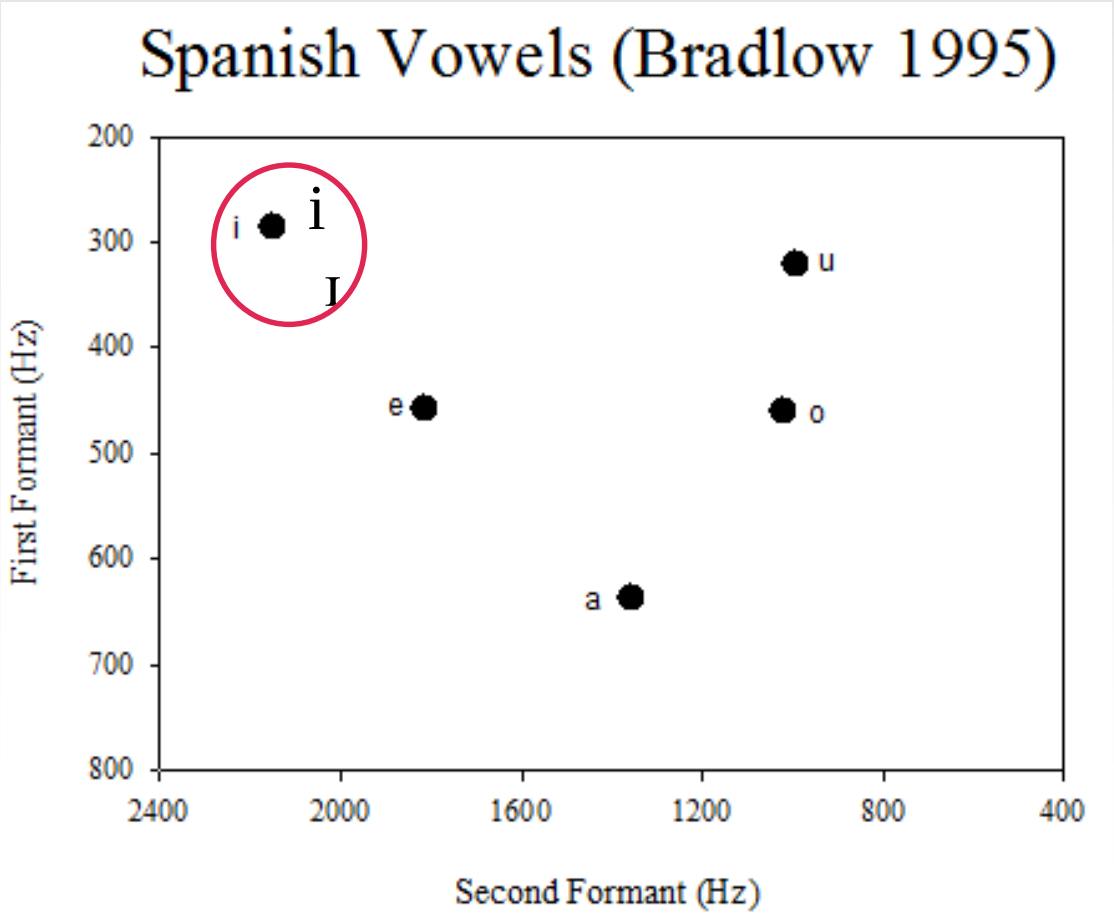


Background: The Desensitization Hypothesis

Chronophilia: Fondness for duration

Use of duration cue by L1 Spanish listeners
→ Desensitization Hypothesis

English /i, ɪ/



Background: The Desensitization Hypothesis

Use of duration cue by L1 Spanish listeners

→ Desensitization Hypothesis:

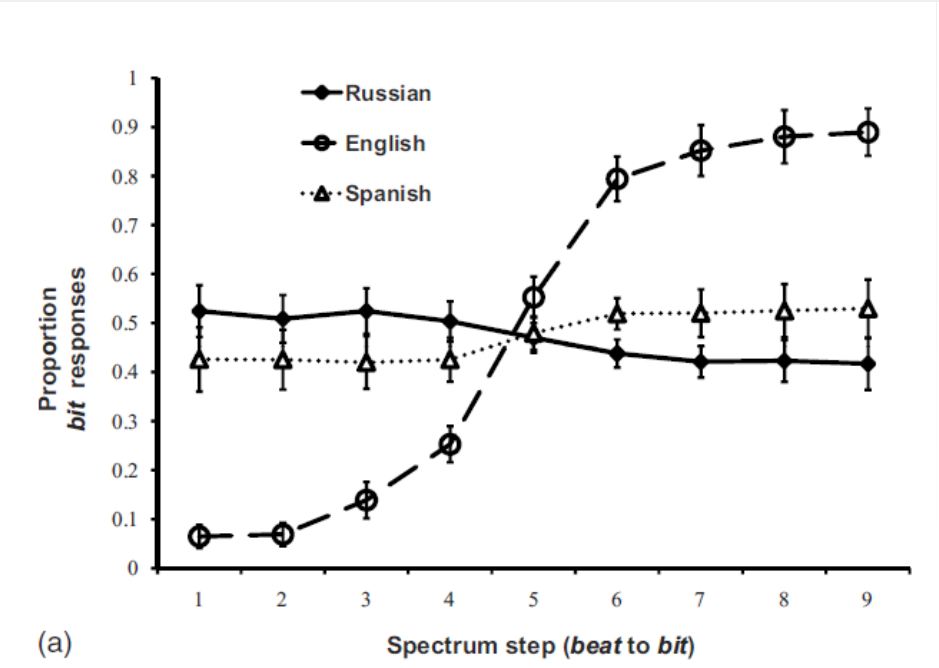
”Whenever spectral differences are insufficient to differentiate vowel contrasts because previous linguistic experience did not sensitize listeners to these spectral differences, duration differences will be used to differentiate the nonnative vowel contrast” (Bohn 1995, 294)

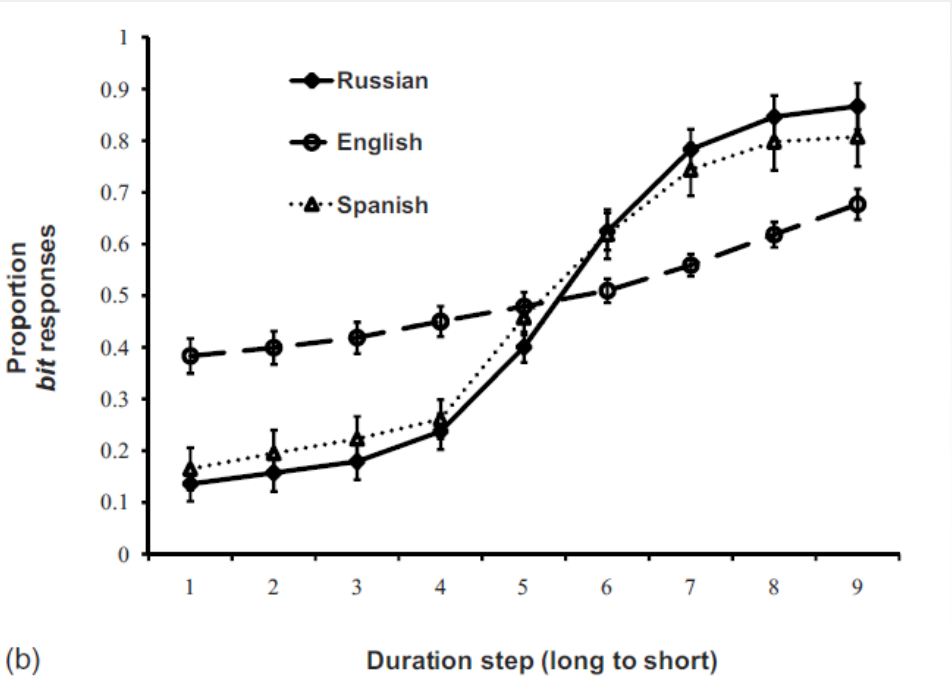
… irrespective of whether the duration cue is phonologically relevant in the listener’s L1

Example 2 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Desensitization Hypothesis: Tested & replicated for L2 English and L1:

Russian and Spanish: Kondaurova & Francis 2008





Example 2 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Desensitization Hypothesis: Tested & replicated for L2 English and L1:

Mandarin: Flege, Bohn & Jang 1997
Portuguese: Rauber, Escudero, Bion & Baptista 2005
Spanish: Escudero & Boersma 2004, Morrison 2005, Kondaurova & Francis 2010
Polish: Bogacka 2004
Catalan: Cebrian 2006

L2 Dutch and L1 Spanish: Escudero, Benders & Lipski 2009

L2 German and L1 Turkish: Darcy & Krüger 2012

L2 German and L1 Italian: Altmann et al. 2012

=> Default reliance on duration to differentiate nonnative vowel contrasts

Examples of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Solid evidence that supports

- NRV framework, existence of NR consonants (NR tones?)
- Desensitization Hypothesis
- (plus other studies suggesting other universal biases):

L2 speech learning =
f (cross-language phonetic relationships)

Incomplete

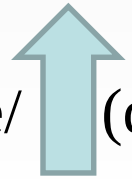
Rather …

Examples of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Solid evidence that supports

- NRV framework
- Desensitization Hypothesis
- (plus other studies suggesting other universal biases):

L2 speech learning =
f (cross-language phonetic relationships)



warp/shape/ (de-)sensitize

Universal phonetic biases

Examples of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

L2 speech learning =
f (cross-language phonetic relationships)

warp/shape/  (de-)sensitize

Universal phonetic biases

Not the whole story because L2 learners

- may be (partly) immune to cross-language phonetic relationships
- may be influenced by “higher-order” characteristics of L1/L2

Example 3 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

L2 learners may be (partly) immune to cross-language phonetic relationships

Example 1: American English /r/-/l/ contrast

Danish, German, French have /r/-/l/

But: major phonetic differences:

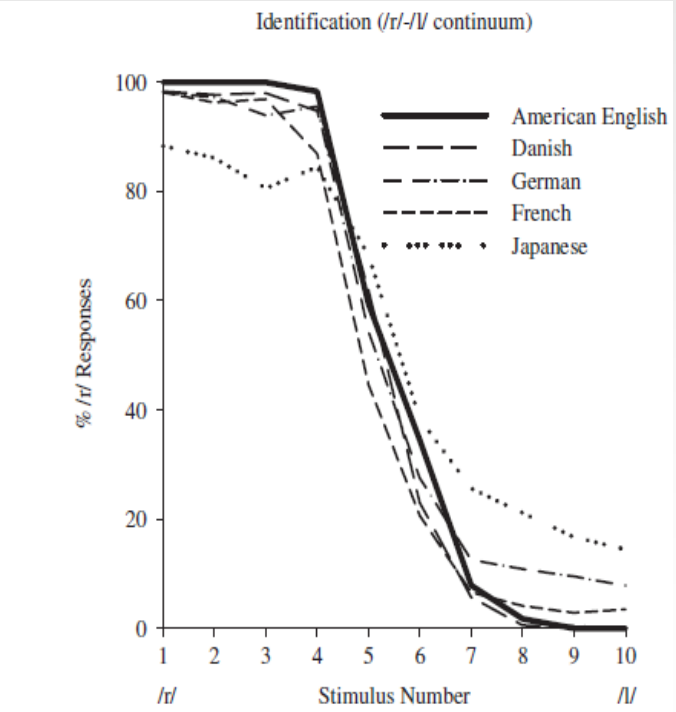
AE [ɻ] vs. DK, GE, FR [l]

AE [ɻ] vs. DK [ʕ], GE and FR [ʁ]

SLM, PAM expectation: Phonetic differences AE vs. DK, GE, FR should compromise perception

Example 3 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

SLM, PAM expectation: Phonetic differences AE vs. DK, GE, FR should compromise perception



Bohn & Best (2012): Not so!

Why not so?

Orthography: Shared <r>

Cognates, e.g., *ring* in E, DK, GE

Phonotactic commonalities

Special (”robust”) phonetic characteristics of [ɹ]

Example 4 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

L2 learners may be (partly) immune to cross-language phonetic relationships

Example 2: American English /w/-/j/ contrast	[w]-[j]
French has /w/-/j/	[w]-[j]
Danish has /v-/j/	[ʋ]-[j]
German has /v/-/j/	[v]-[j]

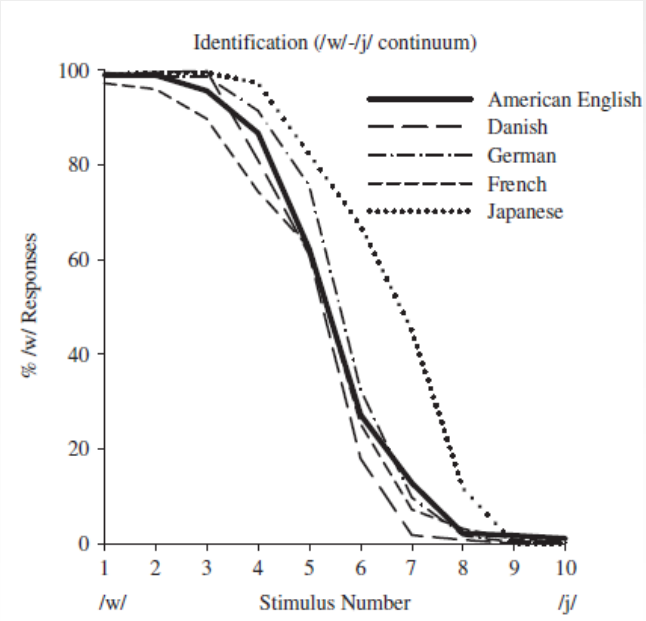
SLM, PAM expectation:

Categorical perception of AE /w/-/j/ by L1 FR

also L1 DK, L1 GE (maybe slightly compromised for /w/)

Example 4 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Expectation: Categorical perception of AE /w/-/j/ by L1 FR, also L1 DK, L1 GE (maybe slightly compromised for /w/)

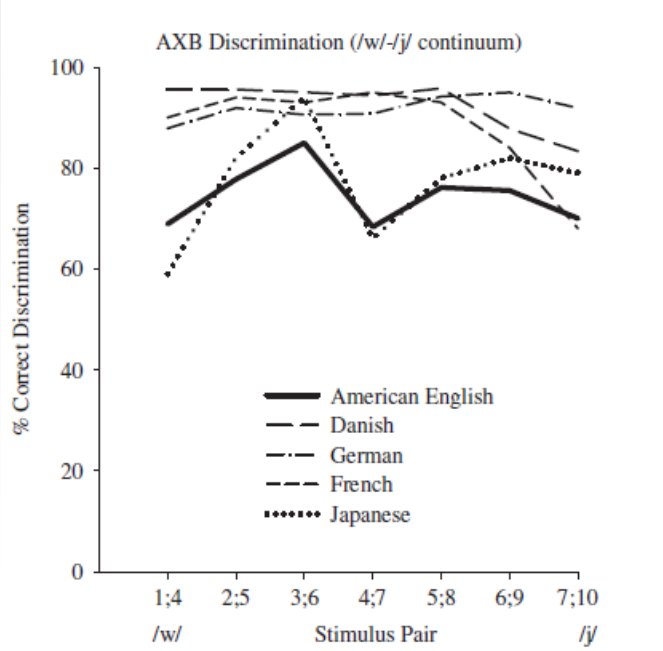


Identification:

L1 AE = L1 FR = L1 DK = L1 GE

Example 4 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Expectation: Categorical perception of AE /w/-/j/ by L1 FR, also L1 DK, L1 GE (maybe slightly compromised for /w/)



Discrimination:

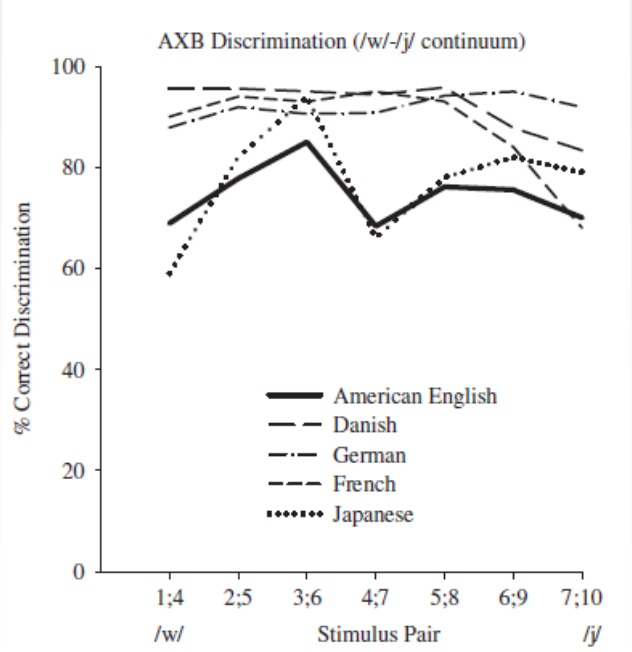
L1 AE < L1 FR = L1 DK = L1 GE

?

Example 4 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Why discrimination: L1 AE < L1 FR = L1 DK = L1 GE ?

SLM, PAM do not predict continuous, near-ceiling discrimination of AE /w/-/j/ by L1 FR, L1 DK, L1 GE



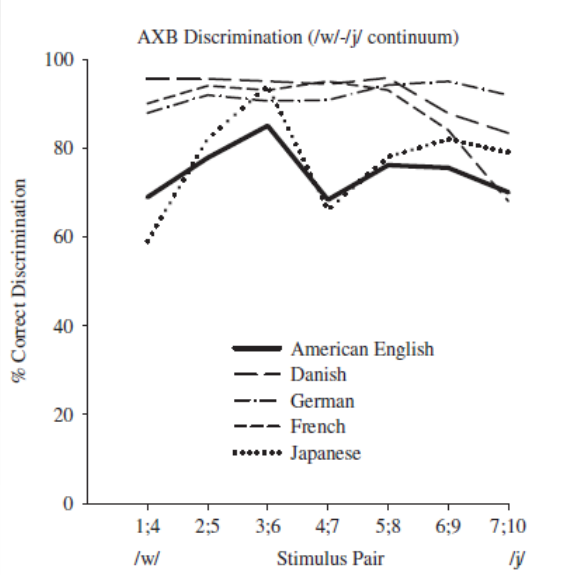
What do FR, DK, GE have in common (vs. AE, JA)?

→ Lip rounding is distinctive in FR, DK, GE (not in AE, JA)

Example 4 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Unexpected continuous, near-ceiling discrimination of AE /w/-/j/ by L1 FR, L1 DK, L1 GE

due to L1 sensitivity to lip rounding distinctions in vowels



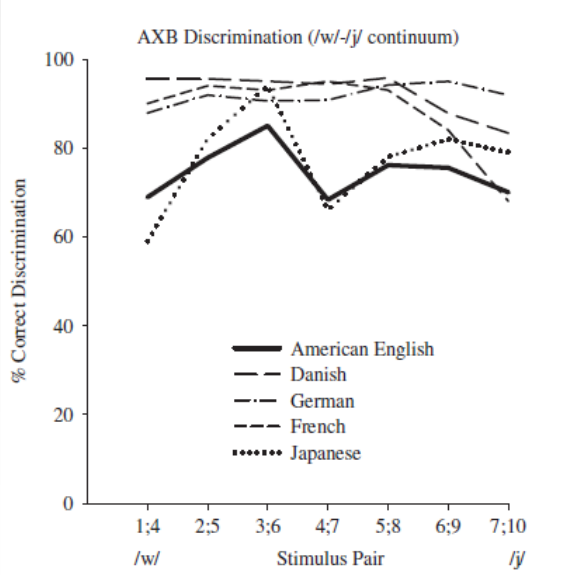
/w/, /j/ are short, nonsyllabic versions of /u/, /i/

If so …

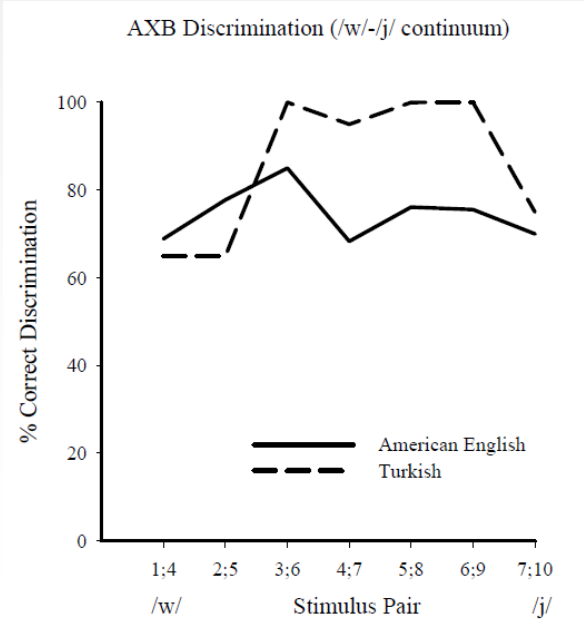
Example 4 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Same continuous, near-ceiling discrimination of AE /w/-/j/ by L1 with lip rounding contrasts?

e.g. Turkish with /v/-/j/ ([ʋ]-[j]) and /i/, /y/, /ɯ/, /u/



Preliminary data:

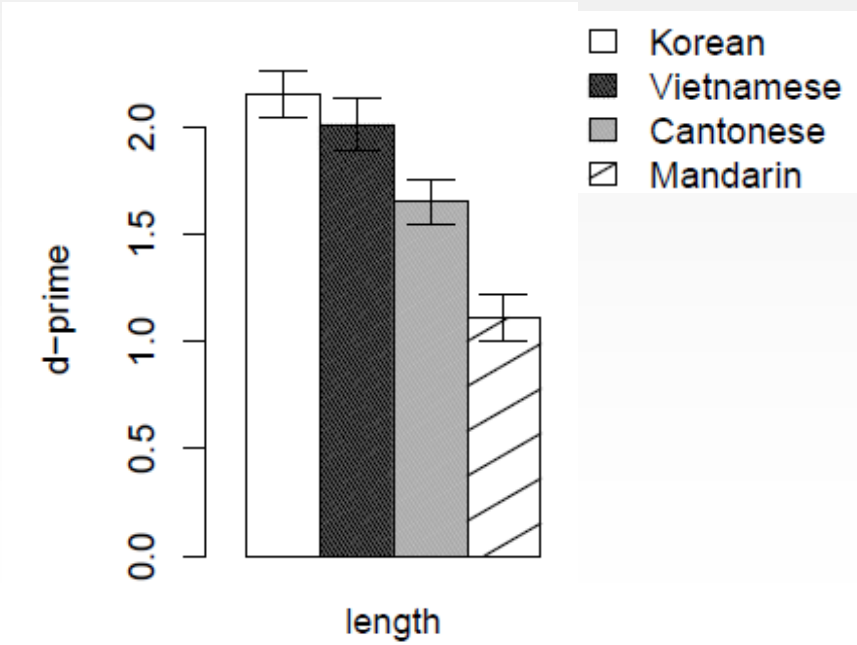


Example 5 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Other indications of systemic “higher-order” factors in L2 speech

Pajak & Levy (2014): Perception of consonant length contrast by listeners with L1

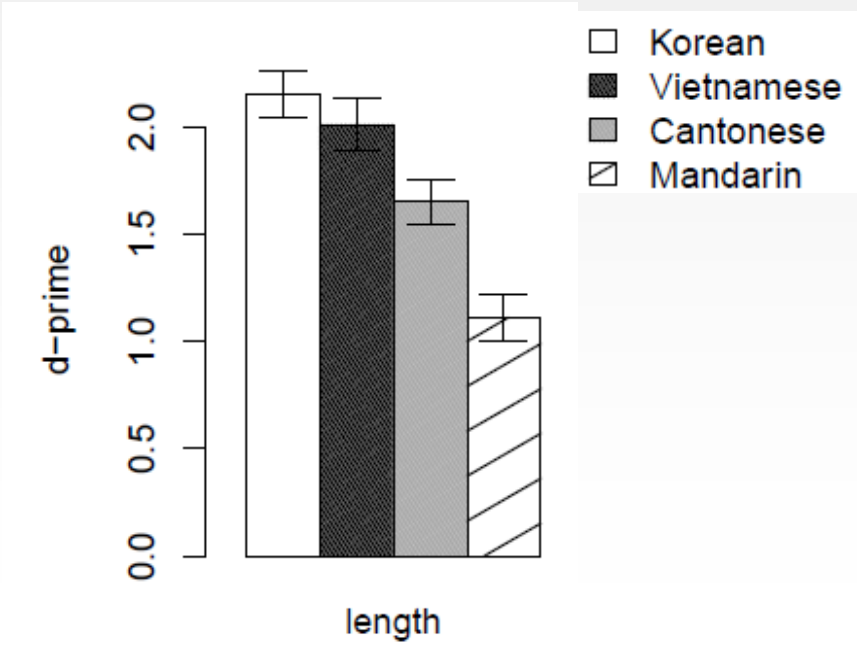
	Length contrast	
Korean	V - V:	C - C:
Vietnamese	V - V:	
Cantonese	V - V:	
Mandarin		



Example 5 of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

Pajak & Levy (2014) : L2 speech perception influenced by enhanced general sensitivity (not just mapping of individual contrasts/segments L2 → L1)

	Length contrast	
Korean	V - V:	C - C:
Vietnamese	V - V:	
Cantonese	V - V:	
Mandarin		



Examples of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

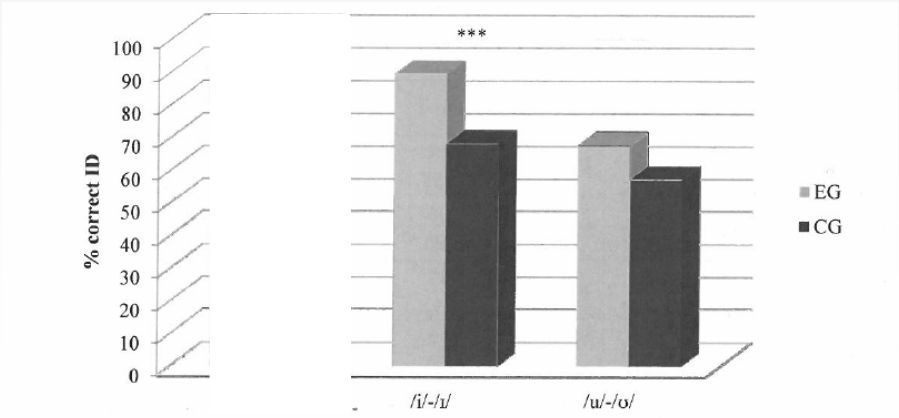
But: Limits on abstraction

Generalization of higher order characteristics limited to

- generalizations L1 → L2 (e.g., segmental length)?
- specific characteristics/dimensions (e.g., segmental length)?

Rato 2014:

L1 Portuguese identification of English tense/lax contrasts



Mean % correct identification for experimental and control group

Examples of L2 speech phenomena not easily accounted for by cross-language phonetic relationships

So, why generalized learning in some cases?

Why phone-specific learning in other cases?

Some ”higher-order” characteristics more (easily) learnable than others

When do **which** ”higher-order” characteristics of the L1 or the L2 attenuate the influence of cross-language phonetic similarity?

Conclusion

L1 (and L2) "higher-order" characteristics

override attenuate

L2 speech learning =

f (cross-language phonetic relationships)

warp/shape/ (de-)sensitize

Universal phonetic biases

(NRV, Chronophilia, …)